

REMARKS/ARGUMENTS

In this Amendment, claim 1 was amended to incorporate the subject matter of claim 4, and claim 18 was amended to incorporate the subject matter of claim 19. Claims 4 and 19 were deleted. Favorable reconsideration of claims 1-3, 5-18, and 20-59 is respectfully requested.

Claim Rejections – 35 USC § 102. Claims 1-59 were rejected under Section 102(e) as being anticipated by Yamamoto et al. (EP 1215310), hereinafter “Yamamoto.” Applicants respectfully submit that the pending claims are not anticipated by Yamamoto and request withdrawal of the rejection.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” M.P.E.P. § 2131 (E8, May 2004) (*quoting Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). “The identical invention must be shown in as complete detail as is contained in the . . . claim.” *Id.* (*quoting Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). In addition, “the reference must be enabling and describe the applicant’s claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention.” *In re Paulsen*, 30 F.3d 1475, 1479, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

Yamamoto discloses the fabrication of p-type zinc oxide by co-doping a p-type dopant and an n-type dopant. The concentration of p-type dopant is selected to be greater than the concentration of the n-type dopant. Yamamoto discloses that the ratio of p-type dopant to n-type dopant is from 1.3:1 to 3:1, and preferably 2:1. High amounts of n-type dopant within p-type zinc oxide will result in significant minority carriers. Any electronic device fabricated with such p-type zinc oxide will be a leaky device and unreliable. Moreover, the high combined dopant content will affect zinc oxide crystallinity and degrade electronic performance. Yamamoto discloses the formation of a donor-acceptor complex, such as Li-F-Li or N-Ga-N. Paragraphs [0023] and [0026]. Yamamoto further discloses the use of a group II element, such as Mg, to stabilize the oxygen atoms in ZnO. Paragraph [0012].

Yamamoto Table 1 reports compounds (2), (3), and (4) as being p-type zinc oxide materials having a resistivity less than 0.5 ohm·cm. These materials include zinc oxide co-doped

with Li and Mg (compound (2)), zinc oxide co-doped with Li and F (compound (3)), and zinc oxide co-doped with Li, F, and Mg (compound (4)). Yamamoto's dopants differ from those recited in the rejected claims. Specifically, Yamamoto does not disclose any p-type zinc oxide semiconductor material having a resistivity less than 0.5 ohm-cm and comprising a p-type dopant selected from nitrogen, phosphorus, arsenic, antimony, bismuth, copper, and chalcogenides of the foregoing, and mixtures thereof (claims 1 and 18) or arsenic (claims 25-48) or antimony (claims 49-59). Because Yamamoto fails to disclose a p-type zinc oxide material having the claimed resistivity and the claimed dopants, applicants submit that the pending claims are not anticipated by Yamamoto.

In addition, there are many other claimed features that are not anticipated by Yamamoto. For example, the self supporting substrates recited in claims 10-13 are not disclosed by Yamamoto. Yamamoto's paragraph [0019] discloses "a silicon single-crystal substrate, a silicon single-crystal substrate having a SiC layer formed therein and a sapphire single-crystal substrate." Because Yamamoto's disclosed substrates do not include the substrates recited in claims 10-13, these claims are not anticipated by Yamamoto.

Yamamoto does not disclose the subject matter of claim 26, wherein the zinc, arsenic, and oxygen atoms are deposited by RF sputtering. Yamamoto's paragraph [0016] discloses preparing the p-type zinc oxide by MOCVD or MBE. Because Yamamoto fails to disclose RF sputtering, claim 26 is not anticipated. Sputtering is also recited in claims 32-43; therefore, Applicants submit that claims 32-43 are not anticipated by Yamamoto.

Moreover, the subject matter of claims 28-31 is not anticipated by Yamamoto. Claim 28 recites the step of "depositing a thin film on the substrate surface comprising zinc and arsenic." Dependent claims 29-31 recite additional details of the thin film comprising zinc and arsenic. Because Yamamoto fails to disclose the features of claims 28-31, these claims are not anticipated by Yamamoto.

Claims 44-48 recite "depositing the thin film of zinc oxide doped with arsenic on the substrate by thermal evaporation." This feature is not disclosed or suggested by Yamamoto. Therefore, Applicants submit that claims 44-48 are not anticipated by Yamamoto.

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In view of the foregoing, Applicants submit that the pending claims are not anticipated by Yamamoto and request withdrawal of the rejection under Section 102(e). If there are any remaining issues preventing allowance of the pending claims that may be clarified by telephone, the Examiner is requested to call the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Evan R. Witt", is written over a horizontal line.

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